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## Blood circulation in the human body

Although the heart plays one of the biggest roles in the circulatory system, the rest of the system is also very important as it is what transports blood to and from the heart to keep the body alive. Blood is transported throughout the body by blood vessels. Blood vessels are complex structures but can be simplified quite significantly. The two main components of blood vessels are the arteries and the veins. Arteries carry oxygenated blood away from the heart, while veins carry deoxygenated blood to the heart. Other blood vessels found in the circulatory system are arterioles and venules. Arterioles are blood vessel that branch off arteries and lead to capillaries. Venules are similar to arterioles but branch off veins and also lead to capillaries. Finally, capillaries are the smallest of the blood vessels that connect arterioles and venules and play an important role in the exchange of gases such as oxygen.

The endothelium can be found throughout the entire circulatory system. It is the thin permeable layer of cells found on the inner walls of all blood vessels. Permeability is the ability of a membrane to allow certain molecules to be transported through it. Permeability of the endothelium is important because oxygen, nutrients and white blood cells need to be transported through the blood vessels to reach other organs.

The three main functions of blood include transport, protection and regulation. Blood transports many different nutrients around the body, blood plays a key role in protection as it decreases inflammation, carries antibodies that destroy bacteria and transports platelets that initiate clotting and finally, blood is useful in regulating the body. For example, the blood along with the nervous system is responsible for regulating pH and water balances.

Although blood vessels are responsible for many different tasks in the human body, they are not involved in regulating the transport of blood. The transportation of blood is controlled by the nervous system. The nervous system is in charge of telling the blood vessels when to constrict and when to dilate. When the body is hot, vasodilation occurs, which is when the diameter of the blood vessels increases allowing more blood to reach the surface of the skin to cool the body down. When the body is cold, vasoconstriction occurs, which is when the diameter of the blood vessels decreases, keeping heat within the body.

Blood Pressure is the amount of force against the walls of the blood vessels by the circulating blood.

Blood pressure decreases as blood vessels go from arteries to arterioles to capillaries, and then veins.

Blood pressure generally however, refers to the pressure in the arteries since they are under the most strain. Blood pressure can be measured in two phases; systolic and diastolic pressure. Systolic pressure is the pressure measured at the highest point, beginning of the cardiac cycle while diastolic pressure is the pressure measured at the lowest point, the resting phase of the heart.

Although the circulatory is considered one large system, there are many subsystems within. The

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pulmonary circuit is the part of the circulatory system that transports blood to and from the heart. The pulmonary circuit consists of the pulmonary vein that carries oxygenated blood from the lungs to the heart, while the pulmonary artery that carries deoxygenated blood from the heart to the lungs. The second circuit is the coronary circulation, which are the vessels that deliver oxygen to the heart itself. Finally, there is the systemic circulation, the rest of the circulatory system that carries oxygen throughout the body.

Another important component of the circulatory system are the valves found in veins. Since valves can also be found in the heart, the term venous valve is used to describe the elastic flap like structures in the rest of body. The circulatory system is designed in away that allows for blood to only travel through the heart and body in one direction. To prevent the back flow of blood, valves can be used.

Like stated above, blood is the liquid medium responsible for carrying many different dissolved substances throughout the body. For instance, hormones, nutrients such as water, glucose, amino acids and minerals and finally waste substances such as carbon dioxide and urea. Blood is composed of three main elements; plasma, formed elements and platelets. Plasma is similar to seawater in which it is water based but contains many salts such as sodium chloride. The formed elements consist of red and white blood cells. Red blood cells are responsible for the transport of oxygen and removal of carbon dioxide. Hemoglobin can be found within red blood cells and bonds to oxygen as a means of transportation. White blood cells are the cells that protect the body against disease and infection. Finally, platelets are very small cells that respond to injury and help blood clot.